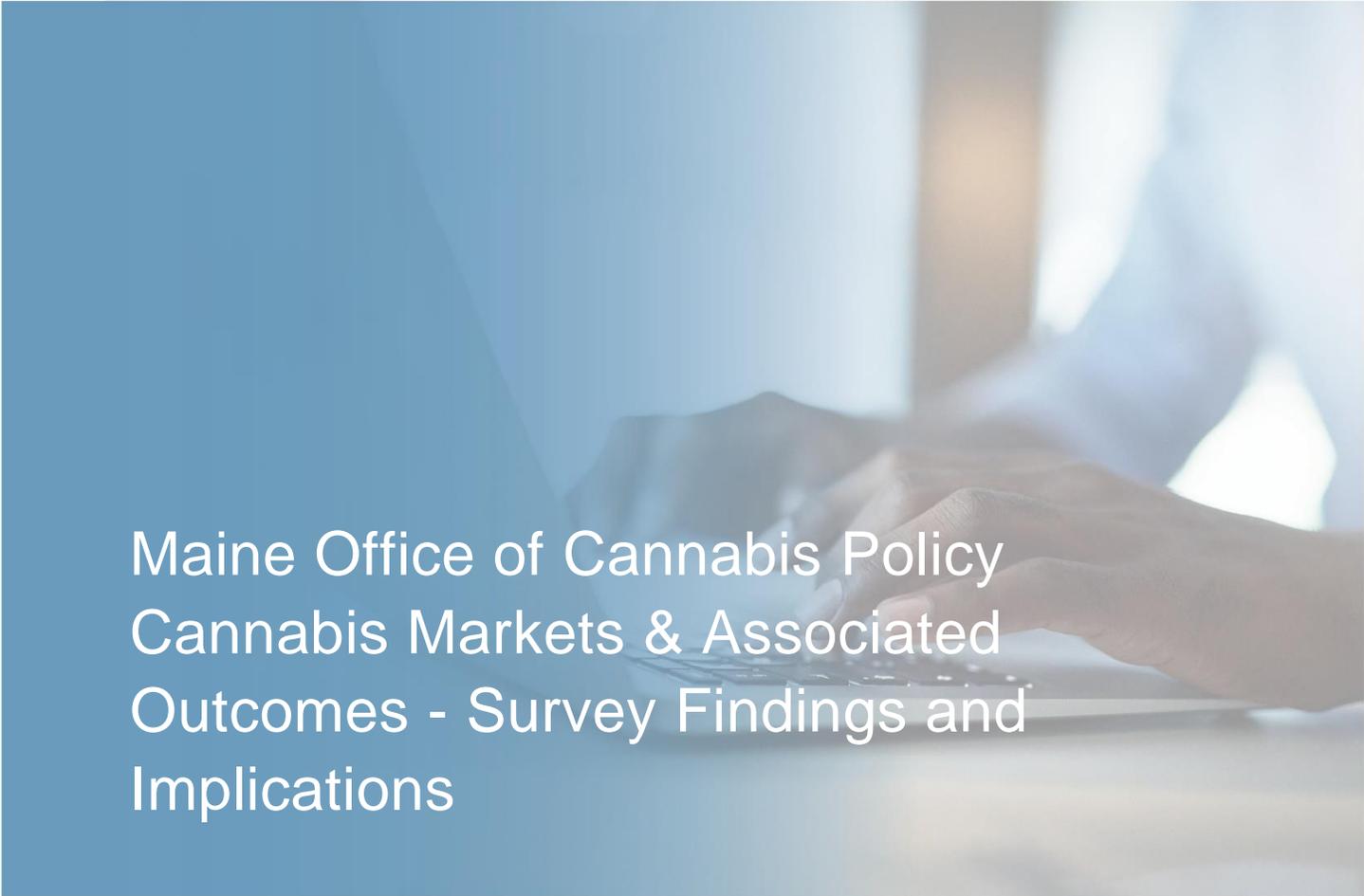




Advocates for Human Potential, Inc.

A background image showing a close-up of hands typing on a laptop keyboard. The image is overlaid with a semi-transparent blue filter. The text of the report title is centered over this image.

Maine Office of Cannabis Policy Cannabis Markets & Associated Outcomes - Survey Findings and Implications

Prepared for:
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Spring
2022

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The general methodology and specific analysis used in this report has been peer-reviewed and validated by over a dozen published researchers. This report was reviewed by the Maine State Economist. Please visit Appendix C for more information on validation of methodological decisions.

Survey Report Summary and Interpretation

The current report details the methods and results of a population-based survey study commissioned by Maine's Office of Cannabis Policy (OCP), conducted between November and December of 2021. The study was designed to examine trends in cannabis consumption and market patterns in Maine as a function of the source by which consumers access cannabis (i.e., various, illicit, and regulated sources). Participants were recruited online between November 15 and December 28, 2021. The discoveries from this study are broken down into two categories: (1) state-wide, population-representative survey findings from participants recruited during the first 3 weeks of data collection, and (2) sub-state survey findings that include participants recruited during the entirety of the study period. The sample characteristics (e.g., demographics, patterns of cannabis use) and statistical methods used were designed uniquely for each of these two sets of sub-studies.

Critical takeaways from the study include the following:

1. About 64% of cannabis accessed for consumption among past-month cannabis users in Maine is estimated to come from a regulated or otherwise legal source; 36% is from an illicit source.
2. When accounting for the time since the first adult-use store was opened in Maine, the current in-state illicit market is likely *smaller* than in most other states with adult-use cannabis laws, suggesting Maine is likely effectively curbing the illicit market at a greater rate than most other states with adult-use laws when accounting for how long adult-use stores have been open.
3. Those who prioritize their source of cannabis highly and those who are younger are more likely to get their cannabis from adult-use stores and to have transitioned to adult-use stores since January of 2021.
4. Living in a ZIP code with 1+ adult-use store is associated with a significant increase in how much of one's cannabis use is sourced from adult-use stores, even after accounting for age, gender, medical cannabis patient status, and illicit cannabis sourcing. This suggests that the presence of an adult-use store may incentivize consumers to access some of their cannabis from the regulated market.
5. ZIP codes that do not have adult-use stores that also demonstrate moderate to high levels of willingness to pay for adult-use cannabis may present relevant locations for future adult-use stores to further transition consumers to the regulated market.
6. Substate analyses within ZIP codes, like the state-wide data, showed that greater reliance on accessing cannabis through dealers and medical sources related to greater Cannabis Use Disorder (CUD) and driving under the influence of cannabis (DUIC), but accessing cannabis through adult-use stores did not relate to either negative health outcome.
7. Based on Cannabis Use Disorder (CUD) screening questions placed in the survey, 1 in every 10 Mainers meet the criteria for CUD, and 1 in every 3 Mainers who use cannabis at least monthly meet the criteria for CUD, a finding relevant for ensuring access to CUD treatment.
8. About six times more individuals who use cannabis at least monthly get their cannabis exclusively from adult-use stores, compared to those who only get their cannabis from an illicit source (6% vs. 1%).
9. Over half (54%) of consumers who purchase from home-based caregivers do not have a medical card.

10. Similarly, approximately 1 in 3 consumers who purchase at medical dispensaries or from caregivers with retail storefronts do not have a medical card (33%).
11. Consumers who purchase from medical sources consume more grams on average than adult-use consumers.
12. For every \$1 of demand for adult-use cannabis in Maine, there is about \$2 of supply. This finding is very consistent with proportions achieved and anticipated elsewhere, and this achievement comes only 1 year after industry standup.
13. When using many documented assumptions that favor results towards a balanced estimate of a medical market demand-to-supply ratio, there is about \$1 in demand for every \$6 of supply, suggesting the medical market is oversupplied relative to the adult-use market and desirable ratios achieved in other states.

Research Design

Survey questions, methods, and analyses used for this study were based on those validated in peer-reviewed, scientific publications authored by the Principal Investigator of this study^{1,2} or other investigators who examine consumption and source patterns of cannabis use in the United States^{3,4}. Two sub-studies were performed to characterize state-wide findings, one based on a demographically representative sample (age, race/ethnicity, and education) and geographically representative sample (ZIP code), and a second designed to more closely examine how cannabis consumption, market dynamics, and outcomes vary by geographic and other substate variables.

To our knowledge, the study is one of the largest surveys to date on cannabis use patterns, illicit and regulated market activities, and cannabis-related public health outcomes in Maine, with 1,129 participants for the *state-wide results* and a total of 1,934 participants for the *sub-state results*.

Please see Appendix A for the final list of survey questions administered to participants, and Appendix C for an overview of research methods.

State-Wide Survey Methods

Participants were recruited from community research panels sourced by Qualtrics⁵. The sample from the state-wide survey showed a strong match in demographic characteristics relative to those of population of Maine. Such representativeness improves our confidence that findings reported in the state-wide survey are fairly indicative of those seen in the general population⁶. The current sample of individuals who use cannabis in the past month from Maine represents a margin of error at 4%, and at a confidence interval of 95%⁷, both of which are within recommended ranges for population studies. In other words, if we repeated the survey of 1,129 Maine residents who use cannabis in the past month 100 times in a row, 95% of the time, the sample proportion we achieved would be 4% points or less from the true population prevalence⁸. These findings provided additional confidence that sample recruited for this study corresponds well to the actual population of individuals in Maine who use cannabis in the past month.

¹ Sofis, M. J., Borodovsky, J. T., Pike, C. K., Liu, L., Jacobson, N. C., & Budney, A. J. (2021). Sifting through the weeds: Relationships between cannabis use frequency measures and delay discounting. *Addictive Behaviors*, 112, Article 106573. <https://doi.org/10.1016/j.addbeh.2020.106573>

² Sofis, M. J., Budney, A. J., Stanger, C., Knapp, A. A., & Borodovsky, J. T. (2020). Greater delay discounting and cannabis coping motives are associated with more frequent cannabis use in a large sample of adult cannabis users. *Drug and Alcohol Dependence*, 207, Article 107820. <https://doi.org/10.1016/j.drugalcdep.2019.107820>

³ The Substance Abuse and Mental Health Services Administration. (2020). *2019 National Survey of Drug Use and Health (NSDUH) releases*. <https://www.samhsa.gov/data/release/2019-national-survey-drug-use-and-health-nsduh-releases>

⁴ Cuttler, C., & Spradlin, A. (2017). Measuring cannabis consumption: Psychometric properties of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). *PLoS ONE*, 12(5), Article e0178194. <https://doi.org/10.1371/journal.pone.0178194>

⁵ <https://www.qualtrics.com/research-services/online-sample>

⁶ [Assessing sample representativeness in randomized controlled trials: application to the National Institute of Drug Abuse Clinical Trials Network - Susukida - 2016 - Addiction - Wiley Online Library](#)

⁷ [Sample size calculator - CheckMarket](#)

⁸ [Erring on the Margin of Error \(wiley.com\)](#)

Key details of survey sample characteristics and methods are noted below:

Table 1. Population Survey Participant Demographics

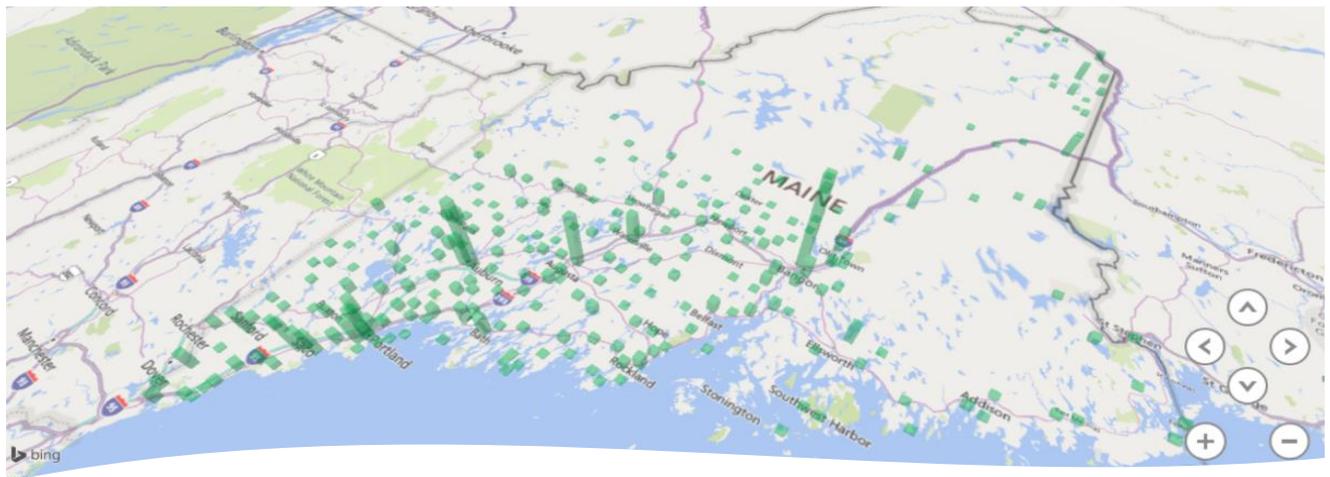
- 1,129 total participants in Maine
- 262 unique ZIP codes
- 41% past-month cannabis users (weighted for cannabis use)
- 44% medical cannabis patients, 9% caregivers
- Participants double screened to verify Maine residency

Variable	Maine Population	Current Sample
Age	≈45 Years Old	≈45 Years Old
Race	94% White	95% White
Ethnicity	2% Hispanic	2% Hispanic
Education	32% Bachelors or Higher	30% Bachelors or Higher

As shown in Table 1, summary data for age, race, ethnicity, and education for participants in our sample closely matched population data in Maine⁹. The close correspondence between demographic characteristics in our data and those in Maine’s overall population increase our confidence in the validity and accuracy of the survey findings.

Figure 1 reflects the number of participants (height of the green bars) per ZIP code who completed the state-wide survey. As can be seen by the taller green bars positioned in cities such as Bangor, Augusta, and Portland, and shorter bars located in northern and western Maine, the geographic distribution of participants who completed our survey appears to generally correspond well with the actual geographic distribution of Maine residents. Given this close correspondence and sampling of 262 unique Maine ZIP

Figure 1. Geographic Representation of Survey Respondents



⁹ World Population Review. (n.d.). *Maine population 2022*. <https://worldpopulationreview.com/states/maine-population>

codes, we can glean greater confidence that the current findings are not impacted by differences in the geographic locations of participants in our survey relative to the actual distribution in Maine.

As seen in Table 2, the vast majority of participants who initially clicked a link to move to the survey page completed the entire survey (83%). Further, 94% of those who were eligible to participate and began the study completed it. We identified 5% of participants who missed our attention check question and were then excluded from our data analysis. The question is designed to exclude those who either are not attending to the survey questions or who are attempting to complete the survey using an automated, computerized bot.

Table 2. Incomplete Survey Metrics

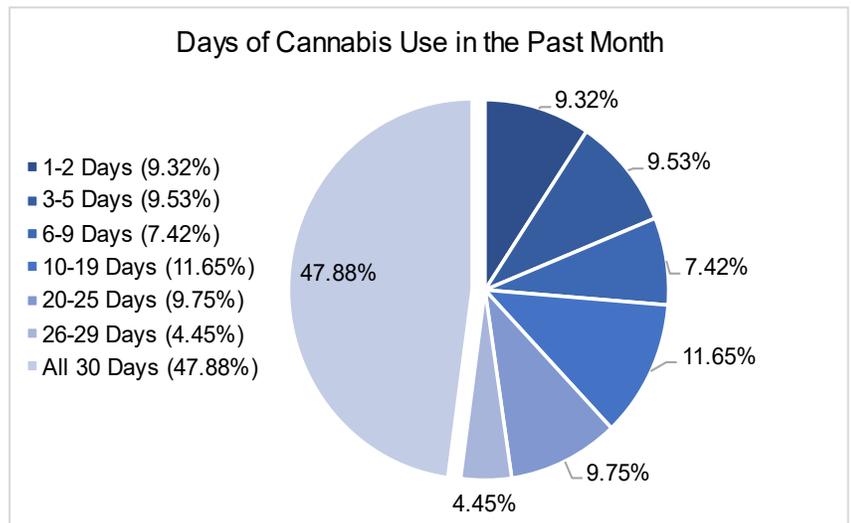
Variable	Maine
Did Not Finish	6%
Too Young	2%
Missed Attention Check	5%
Did Not Consent	4%

Market Findings of State-Wide Survey

Cannabis Use Consumption Patterns

Among the state-wide sample of 1,129 participants, 472 reported using cannabis in the past month (41%). This is significantly more than the most recent data from the National Survey on Drug Use and Health (NSDUH), conducted prior to the COVID-19 pandemic, which suggests that only 17% of Maine residents used cannabis in the past month. However, our participant recruitment strategy likely resulted in an over-weighting¹⁰ of cannabis users that does not represent the “true” prevalence of past-month cannabis use in Maine. Despite the over-weighting and given national-level increases in past-month use reported in other national surveys¹¹, we estimate that the past-month prevalence of cannabis use in the Maine is closer to 25–30% than 17%, particularly since the onset of the COVID-19 pandemic.

Figure 2. Days of Cannabis Use in Past Month

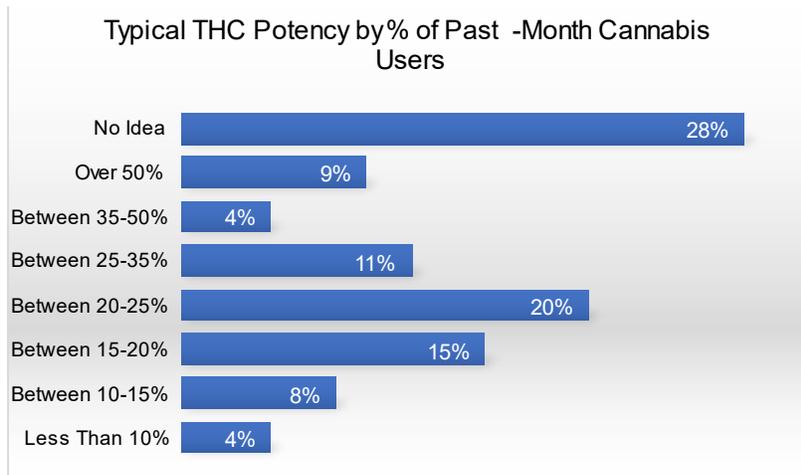


¹⁰ Please see Appendix for definitions

¹¹ [2020 National Survey of Drug Use and Health \(NSDUH\) Releases | CBHSQ Data \(samhsa.gov\)](https://www.samhsa.gov/2020-national-survey-of-drug-use-and-health-(nsduh)-releases)

Among past-month cannabis users surveyed in Maine, we found that more than 50% used cannabis 26 or more days per month. Approximately 25% of past-month cannabis users reported using 1–9 days per month and 25% reported using between 10–25 days per month.

Figure 3. THC Potency by % of Past-Month Cannabis Users

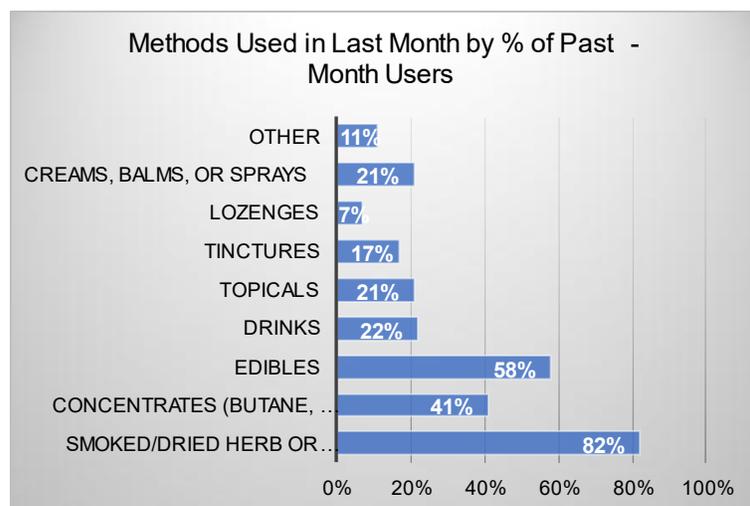


Consistent with data from other states with legal medical and adult-use cannabis, the most common potency percent (%) category for Tetrahydrocannabinol (THC) products was 20–25%. However, more than 1 in 10 past-month cannabis users in Maine reported typically using cannabis products with THC content greater than or equal to 35%. When asked how they determined the THC content in the cannabis they accessed, participants indicated they most commonly learned THC content

through dispensary or adult-use store labels or from staff members there (52%). About 1 in 4 indicated not knowing how much THC or how much Cannabidiol (CBD) was in their cannabis, and about 1 in 5 reported learning this information through friends, family, or online research methods.

Past-month cannabis users were asked to indicate all of the methods of cannabis administration that they had used in the past month. Methods presented to choose from were smoked/dried herb or flower, concentrates, edibles, drinks, topicals, tinctures, lozenges, creams/sprays/balms, and other methods. Past-month cannabis users in Maine averaged using approximately three methods per month. As shown in Figure 4, the most common methods of use were smoked/dried herb or flower, followed by edibles and concentrates. All other methods were used by less than a quarter of past-month cannabis users in Maine. We also found that fewer than 1 in every 4 past-month cannabis users in Maine only used one method in the past month. Together, these data suggest that most past-month cannabis users in Maine mix and match various methods of use each month.

Figure 4. Methods Used in Last Month by % of Past-Month Cannabis Users



Cannabis Market Estimates

Participants reported how many grams of cannabis they accessed in the past month from the following list:

- Maine adult-use retail store
- Medical dispensary or caregiver retail storefront
- Home-based caregiver/caregiver without a storefront
- Friend or family member (bought or for free)
- Illicit dealer
- Personal home grow
- Another source

As can be seen by Table 3 below, approximately 35% of cannabis accessed by past-month cannabis users in Maine was a legal and regulated purchase from an adult-use store, a medical dispensary, or a caregiver retail store. Because our survey results showed that 54% of consumers reported that they purchased their cannabis from a home-based caregiver without being an actively registered medical cannabis patient, we have concluded that 54% of the demand for home-based caregivers are illicit per Maine’s medical cannabis laws. Similarly, 33% of consumers reported that they purchased their cannabis from a medical dispensary or a caregiver retail storefront without being an actively registered medical cannabis patient. As such, we concluded that 33% of the demand for medical dispensary or caregiver retail storefronts are also illicit, per Maine.

About 8% of cannabis was accessed through an illicit dealer and 4% from sources not listed, both of which were counted towards total illicit use to provide a conservative estimate. Accessing cannabis from a personal home grow accounted for 17% of total grams; of this percentage, those who used cannabis from their own home grow predominantly (97%) reported growing at or under the limits set for number of plants by adult-use and medical laws, presuming this source is all legal but not technically regulated.

		Weighted % of Grams/Source
	Source	
	Adult-Use	15%
	Medical Disp./Caregiver Retail (Regulated)	15%
	<i>Medical Disp./Caregiver Retail (Illicit)</i>	8%
	Caregiver W/O Store (Regulated)	5%
	<i>Caregiver W/O Store (Illicit)</i>	6%
	Free/Bought from Friends/Family (Regulated)	11%
	<i>Free/Bought from Friends/Family (Illicit)</i>	11%
	<i>Dealer</i>	8%
	Home Grow	17%
	<i>Other</i>	4%
	Illicit	36%
	Legal	64%
	Total	100%

Table 3. Demand Source of Cannabis by Weighted % of Gram

Note: Illicit source estimates are italicized.

When calculating an overall estimate for the percent of cannabis accessed by past-month cannabis users in Maine by each market (legal vs. illicit), we sum the 15% adult-use, 15% total medical dispensary/caregiver retail store, 5% home-based caregivers, 11% free/bought from friends and family, and 17% home grow to arrive at a conservative estimate of 64% of cannabis accessed by Maine residents being legal. Given that it is unlikely that all cannabis accessed through friends and family is within gifting regulations, we assumed in the final calculation that 50% of all cannabis accessed through this source category was illicit, and 50% was legal.

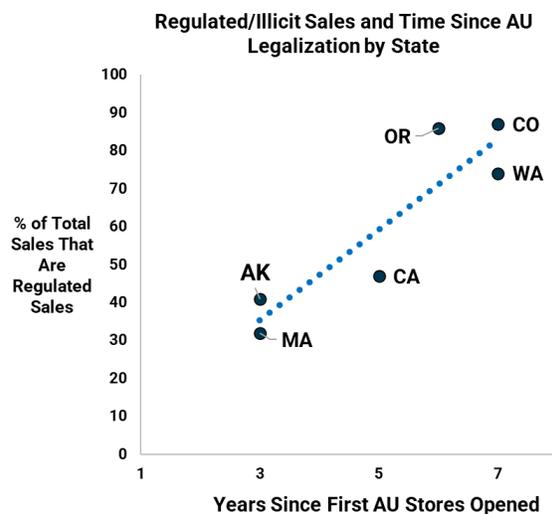
These calculations result in a final estimate that 64% of cannabis consumed by past-month cannabis users in Maine is regulated or from a legal source, and 36% is illicit.

Data on illicit market estimates for other states is limited, but recent evidence¹² suggests a strong correlation with years since adult-use stores have opened and lower proportions of illicit cannabis as a function of total cannabis. As shown in Figure 5, there is an almost perfect correlation when examining years since the opening of the first adult-use retail store and percent (%) of total sales that are regulated, when examining data from Alaska (AK), California (CA), Colorado (CO), Massachusetts (MA), Oregon (OR), and Washington (WA).

Across these states, the average years since their adult-use stores first opened is about 5 years and the average % of total sales that are regulated is approximately 61%. The blue trend line in Figure 5 shows that it would be reasonable to assume that, because Maine's first adult-use store opened approximately 1 year ago, the percentage of sales that are legal should be below 30%. However, as demonstrated in Figure 6, Maine (ME) deviates from this pattern *considerably* by demonstrating a proportion of regulated to total sales consistent with a state that has had adult-use stores opened for approximately 5 years.

These findings suggest it is likely that Maine is curbing the illicit market at a greater rate than other states that have implemented adult-use laws, when accounting for how long adult-use stores have been open. While this finding is promising, it should not be misconstrued to mean that the adult-use market has

Figure 5. Regulated/Illicit Sales and Time Since AU Legalization by State



¹² New Frontier Data. (n.d.). *Cannabis in America for 2021 & Beyond: A New Normal in Consumption & Demand*. <https://newfrontierdata.com/product/cannabis-in-america-for-2021-and-beyond/>

reached homeostasis. Future policy decisions, such as delivery of cannabis by stores or other licensees, will greatly impact the speed of which the illicit market may be curbed.

Importantly, although the total amount of past-month cannabis accessed from adult-use stores is estimated to be around 15% in Maine right now, 46% of past-month cannabis users have purchased cannabis from an adult-use store in the last month, which is the second highest percentage of any source after medical dispensary/caregiver storefront and accessing from friends and family (free or bought). Moreover, consumers in Maine often access cannabis through several sources, which may suggest most do not find one source as optimal. For example, when summing the number of sources across all past-month cannabis users in Maine, we find that about one quarter uses only one source, one quarter uses two sources, one quarter uses three to four sources, and one quarter uses five to seven sources. Therefore, more than 75% use at least two sources, and about 50% use three or more sources every month. A similar story emerges when examining the percentage of past-month cannabis users in Maine estimated to access all of their cannabis from regulated sources.

Figure 6. Regulated/Illicit Sales and Time Since AU Legalization by State Inclusive of Maine

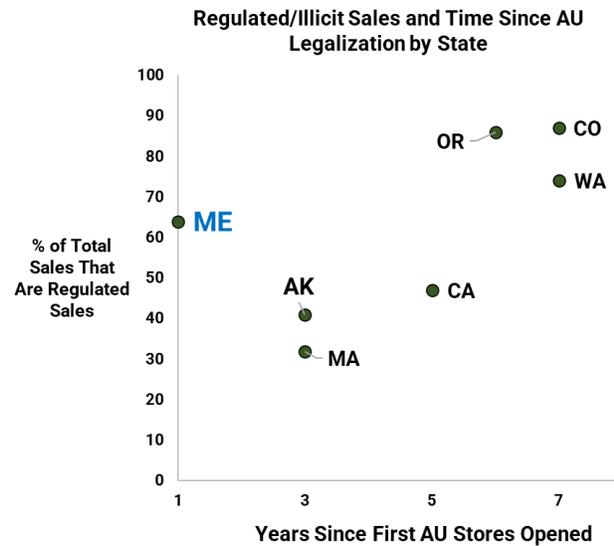
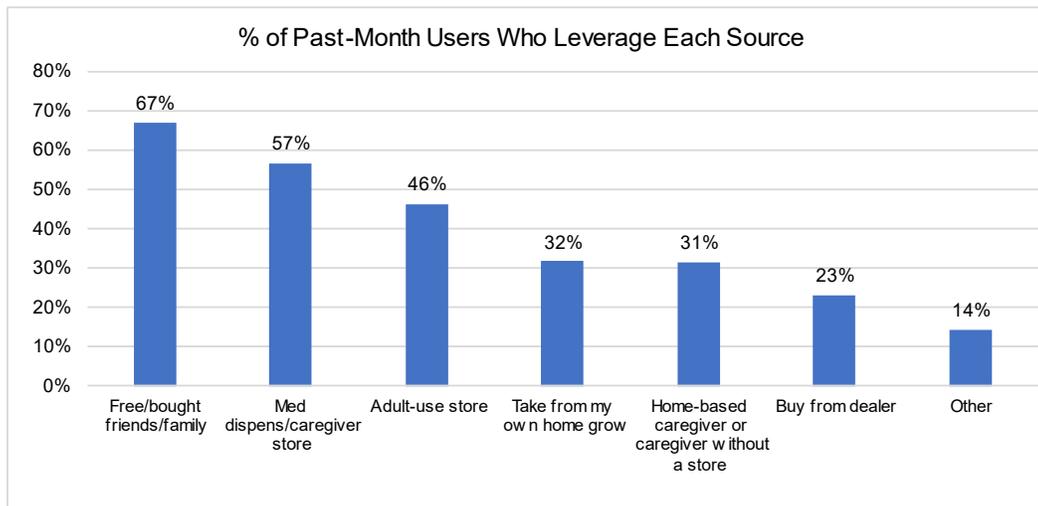


Figure 7. % Of Past-Month Users by Source (Not Weighted)

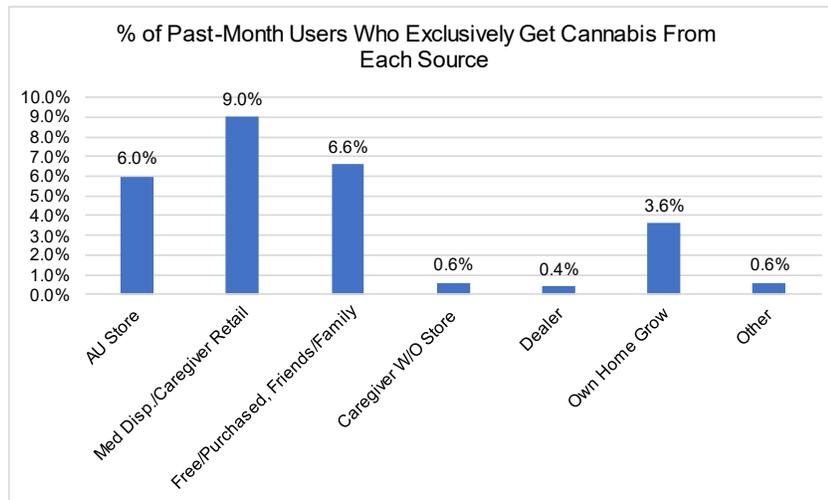


As shown in Figure 8 below, 9%, 7%, and 6% of past-month cannabis users exclusively acquire their cannabis from either medical dispensary/caregiver retail stores, friends and family, or adult-use stores, respectively. Less than 1% exclusively access their cannabis from dealers, home-based caregivers/caregivers without a storefront, and from other sources. These findings suggest that past-

month cannabis users who frequent illicit markets are transitioning to the adult-use market, as about half already access cannabis from adult-use stores. On average, a past-month cannabis consumer in Maine acquires their cannabis from 3 sources.

Additionally, about six times more past-month cannabis users in Maine exclusively get their cannabis from adult-use stores compared to those who only get their cannabis from a dealer or other sources.

Figure 8. Percent of Past-Month Users that Exclusively Get Cannabis from Each Source



Transitioning to a Regulated Market

Those who used cannabis in the past month were asked to indicate whether the amount of cannabis they accessed from each source increased, decreased, or stayed the same, or if they have not accessed cannabis from that source at all since January of 2021. We found an estimated overall upshift in the regulated market between January of 2021 and November/December of 2021 of approximately 12%. Interestingly, we found that those who prioritize their source of cannabis highly and those who are younger are more likely to use adult-use stores for their cannabis and to have shifted to adult-use stores from other sources since January of 2021.

Public Health Findings of State-Wide Survey

Health Outcomes and Cannabis Sources

We found that approximately 28% of past-month cannabis users reported driving under the influence of cannabis (DUIC) in the past year, which, compared to recent national data¹³, suggests fairly standard levels of DUIC. Additionally, an estimated 31% of past-month cannabis users met the criteria for

¹³ [Perceived safety of cannabis intoxication predicts frequency of driving while intoxicated - ScienceDirect](#)

Cannabis Use Disorder (CUD), a diagnosis given for problematic cannabis use. Given that Maine likely has a higher prevalence of past-month cannabis users relative to other states, the overall prevalence of CUD in Maine may be approaching 1 in 10 adults. It is worth noting that CUD is not simply based on the amount of cannabis a person uses. Rather, its diagnostic criteria includes a persistent desire, or unsuccessful efforts to cut down or control cannabis use, and a great deal of time spent in activities necessary to obtain cannabis, use cannabis, or recover from its effects¹⁴.

Notably, when examining grams of use for each source of cannabis in relation to DUIC, CUD, and days of tobacco use in the past month, all sources *except* for accessing from adult-use stores showed a positive relationship with one or more of these negative public health outcomes. Further, those who accessed cannabis from a dealer showed significant relationships with CUD, DUIC, and tobacco use. Although future research will be needed to verify how these findings maintain once a greater proportion of past-month cannabis users in Maine prioritize accessing cannabis from adult-use stores, these findings suggest that, if anything, the implementation of adult-use stores might be less risky for negative health outcomes associated with cannabis use.

Table 4. Health Outcomes Linked to Source

Source	# of Negative Outcomes Linked To	Outcomes Significantly Linked To
Buy from dealer	3	CUD, DUIC, Tobacco Use
Med dispensary/caregiver retail store	2	CUD, DUIC
Free/purchased from friends/family	2	DUIC, Tobacco Use
Caregiver without a store	2	CUD, Tobacco Use
Other	2	CUD, Tobacco Use
Take from my own home grow	1	DUIC
Adult use store	0	NA

The findings presented in Table 4 are the result of multiple statistical analysis deciphering the effect size of relationships between grams of use from each source and the outcome of interest (e.g., CUD). All references to “significant” outcomes suggest confidence in findings is at or greater than 95%. This can be interpreted to mean that the relationship between each outcome and grams acquired from each source are extremely unlikely to occur by chance.

Sub-State Survey Methods and Results

¹⁴A manuscript authored by the Principal Investigator and author of this study is currently being prepared showcasing national status of CUD population prevalence in states with legal cannabis laws. It should be noted that Maine’s CUD population prevalence identified in this study (~10%) is low comparative to other states with legal cannabis laws, with other states averaging closer to 15%, or roughly 1 in 7 people. It should also be noted that, per this report and the manuscript in preparation, that CUD rates are not a direct result of cannabis legalization.

When using data from the population samples (see sections above), we found that individuals living in a ZIP code with an adult-use store exhibited much greater proportions of cannabis sourced from an adult-use store, even when controlling for the influence of illicit cannabis use, age, gender, and medical cannabis patient status.

The sub-state survey was identical to the population survey, with the exception that an additional 805 participants were recruited, 462 of whom were past-month cannabis users. This resulted in a total sample of 1,934 participants (934 reporting past-month use). The primary goal of the sub-state survey was to increase the sampling of past-month cannabis users to provide a more comprehensive examination of how geographic variables impacted cannabis use patterns, illicit and regulated market activity, cannabis-related public health outcomes, and interactions between these outcomes of interest.

ZIP Code Snapshot Analyses of Sources

We performed a series of analyses examining sources from which participants accessed cannabis across ZIP codes in which many participants reported residing. Table 6 (below) shows the 11 ZIP codes with at least 15 survey participants who used cannabis in the past month. For each of these 11 towns/cities/ZIP codes, the table details the average willingness to pay per gram of adult-use cannabis, average total grams accessed in the last month, and average proportion of cannabis accessed from adult-use stores, dealers, medical dispensaries/caregiver retailers, home-based caregivers/caregivers without a store, and from friends and family.

Like in the state-wide survey results, we found that our sample was representative of the population of Maine. We found similar results for each key demographic variable relative to the population of Maine. Specifically, our sample was 93% White (ME Population =94%), the average age was 45 years old (ME Population = 45), 3% were Hispanic (ME Population = 2%), and 27.4% had a bachelor’s degree or higher (ME Population = 32%).

Table 5. Sub-State Survey Participants Demographics

Variable	Maine Population	Current Sample
Age	≈45 Years Old	≈45 Years Old
Race	94% White	93% White
Ethnicity	2% Hispanic	2% Hispanic
Education	32% Bachelors or Higher	27.4% Bachelors or Higher

Notably, participants in areas with adult-use stores showed a trend toward being willing to pay a significant amount more for adult-use cannabis than those in areas without such stores. Further, greater

willingness to pay¹⁵ for adult-use cannabis by area was strongly correlated with greater proportions of adult-use cannabis, but not illicit cannabis, accessed by area.

When examining the areas in Table 6 below that do not have an adult-use store and that showed approximately average willingness to pay (WTP) for adult-use cannabis (\approx \$10.32), it can be inferred that ZIP codes 04005 (Biddeford), 04072 (Saco), and 04468 (Old Town) may be particularly relevant areas for the addition of adult-use stores. Although local opt-out decisions present a barrier to adding adult-use stores to these areas, the relatively high willingness to pay for adult-use cannabis in these areas without adult-use stores highlights potential, economic, and public interest in support of the opening of adult-use stores. Despite the promise of these findings, the relatively small sample sizes per ZIP code suggest there is a need to replicate these findings when collecting additional data in a future survey.

Table 6. ZIP Code–Based Analysis by Source

Town/City	ZIP	Total Grams	AU	Dealer	WTP AU \$	AU Store
Biddeford	04005	9.1	25%	7%	10.75	No
Saco	04072	20.8	18%	3%	11.87	No
Sanford	04073	26.2	21%	12%	9.45	No
Portland	04101	20.7	33%	11%	12.7	Yes
Auburn	04210	13.4	15%	2%	8.94	Yes
Lewiston	04240	21.0	25%	10%	13.86	Yes
Augusta	04330	17.9	31%	7%	9.27	No
Bangor	04401	18.5	18%	6%	10.47	Yes
Old Town	04468	20.4	18%	5%	10.27	No
Houlton	04730	29.2	14%	7%	6.88	No
Waterville	04901	18.3	10%	3%	9.04	Yes

Note: Bolded town/city/ZIP codes represent areas currently without an AU store that demonstrate relatively high WTP for AU, and thus a promising location for an AU store. “AU” stands for adult-use, “WTP” stands for willingness to pay.

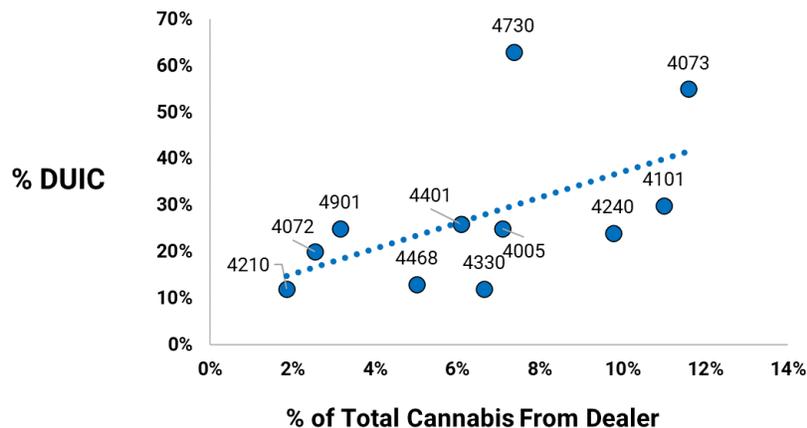
¹⁵ See Appendix for definitions

The Old Town, Biddeford, and Saco ZIP codes bolded in the table above represent potentially favorable locations in Maine where consumers show characteristics consistent with a high interest in accessing their cannabis from adult-use stores. Specifically, we see that consumers in these locals are willing to pay more for adult-use cannabis, which indicates an interest and often a propensity to access cannabis from adult-use stores in localities already with adult-use stores. Given that individuals in these ZIP codes already show generally high amounts that they are willing to pay for adult-use cannabis even though they do not live in a locality with a store, it stands to reason that many will show an interest in accessing more cannabis from adult-stores if stores are opened in those ZIP codes, and transition away from illicit sources as well as their potential health outcome risks detailed in Table 4 and discussed below.

ZIP Code-Specific Source Relationships with Public Health Outcomes

We found that reliance on accessing cannabis from dealers was associated with a higher percentage of individuals in the same ZIP code that reported DUIC (see Figure 9). We also found that reliance on dealers and home-based caregivers/caregivers without a store both showed associations with higher propensities for CUD by ZIP code (see Figures 10 and 11). Notably, accessing cannabis via adult-use stores did not relate to either DUIC or CUD, as we observed in the state-wide findings. Together with the state-wide findings and the above findings, leveraging ZIP code-specific analyses further point to the potential for lower public health risks as a function of greater participation in the adult-use market. These findings should be encouraging for municipalities that are considering opting in to allow adult-use cannabis retailers as a way to reduce potential harms in their jurisdictions.¹⁶

Figure 9. Greater % from Dealer Across ZIP Codes Relates to Greater DUIC



¹⁶ For this study, we used the Cannabis Use Disorder Identification Task – Short Form (CUDIT-SF), which is a three-item self-reported tool that provides an accurate estimate of whether an individual meets criterion for CUD. Scores on this scale range from 0-16, with higher scores representing more problematic use, and scores at or above 2 representing CUD. Initial validation for the CUDIT-SF was established here: [Preliminary Development of a Brief Cannabis Use Disorder Screening Tool: The Cannabis Use Disorder Identification Test Short-Form - PubMed \(nih.gov\)](#)

Figure 10. Greater % from Dealer Across ZIP Codes Relates to Greater CUD

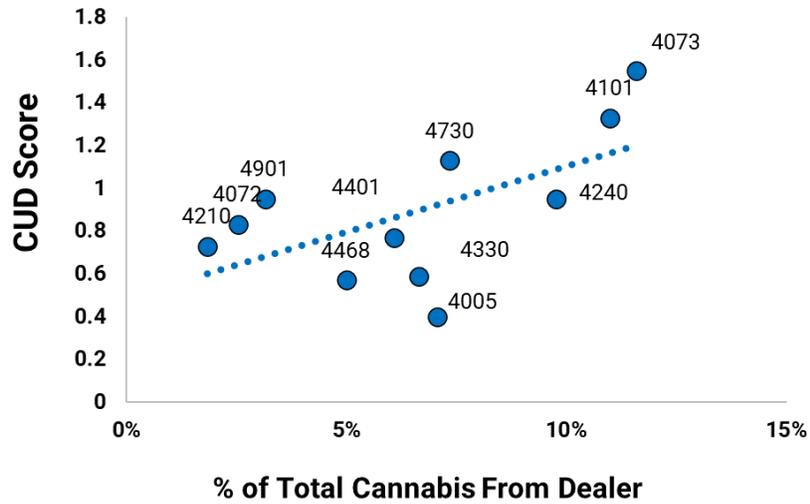
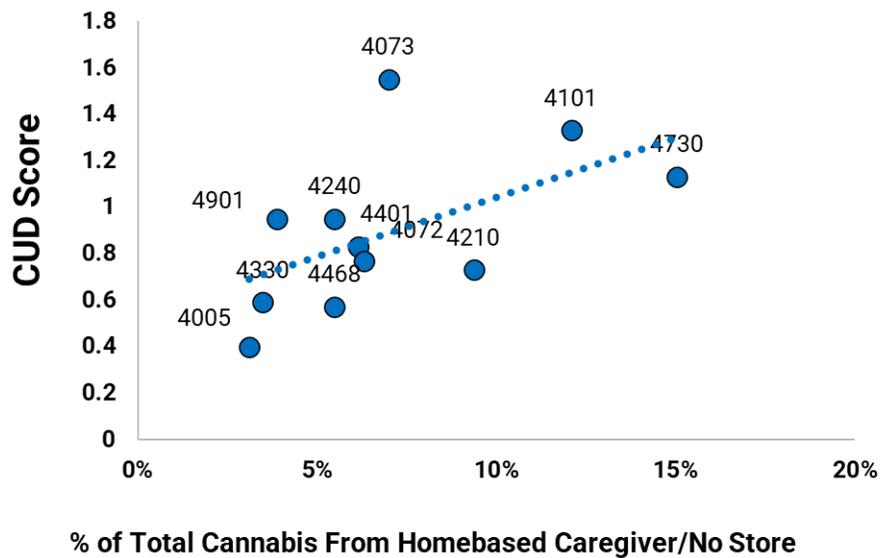


Figure 11. Greater % from Home-Based Caregiver/Caregiver Without a Store Across ZIP Codes Relates to Greater CUD



Demand Estimates

With the survey data reflected throughout this report, we identified and projected demand for each cannabis market. The below calculations are estimates of the adult-use, medical, and illicit market demand for cannabis among Maine residents. Consistent with the other findings in this report, the findings were derived from a large research survey, with data collection for the survey occurring between November and December of 2021. *As Mainers were the only eligible participants to respond to the survey, it is of note that demand accounted for by tourism or by visiting patients is not calculated in these estimates.*

To calculate demand, we first collected information on the total population of Maine based on 2020 census data (i.e., 1,362,000). The census data also revealed that 81.5% of the Maine population was age 18 or older, or 1,110,000 residents¹⁷. Data from our survey suggested 41% of adult Maine residents reported using cannabis in the past month. Data from the NSDUH suggested approximately 18% of Maine residents 18 years of age and older used cannabis in the past month¹⁸.

Table 7. Average Grams per Past-Month User by Source

Source	Past-Month Grams/Past Month User
Adult-Use	2.9
Medical Disp./Caregiver Retail (Regulated)	3.0
Medical Disp./Caregiver Retail (Illicit)	1.5
Caregiver W/O Store (Regulated)	1.06
Caregiver W/O Store (Illicit)	1.24
Free/Bought from Friends/Family (Regulated)	2.05
Free/Bought from Friends/Family (Illicit)	2.05
Dealer	1.6
Home Grow	3.3
Other	0.7
Total	19.4

¹⁷ United States Census Bureau. (n.d.). *Maine: 2020 Census*. <https://www.census.gov/library/stories/state-by-state/maine-population-change-between-census-decade.html>

¹⁸ Our survey was only issued to those 21+ years of age. However, the US Census collects data on 18 and older, as opposed to 21 and older. It is because of this and the desire to stay consistent with other publications on the topic, we utilize the 18+ population as opposed to the 21+ population when deciphering demand.

Our recruitment approach was designed to recruit a higher proportion of past-month cannabis users than necessarily exists in the population to ensure a greater accuracy of cannabis use (grams). Because of this, we provide a sensitivity analysis to account for over-weighting. When calculating estimated total demand in grams, we multiplied grams per source (identified in Table 7) assuming 41% past-month cannabis users in Maine (i.e., liberal estimate), assuming 18% past-month cannabis users in Maine (i.e., conservative estimate), and the median of these estimates, which was 30% (i.e., neutral estimate). We then took the average number of grams per past-month cannabis user for each source and multiplied that number by the total estimated past-month cannabis users for each of the three estimates (i.e., liberal, conservative, and neutral).

Based on the relative proportions of cannabis per source that we determined by dividing the average grams per source by the sum of grams for all market sources, we determined the total estimated grams per month and per year (multiplied per month estimate by 12). The demand findings for legal and illicit sources are further summarized in Table 8.

Table 8. Sensitivity Analysis of Annual Grams Weighted by Source

Source	Annual Grams Weighted		
	Conservative (18% past-month users)	Neutral (30% past-month users)	Liberal (41% past-month users)
Adult-Use	7,069,115	11,569,399	16,069,666
Medical Disp./Caregiver Retail (Regulated)	7,305,565	11,956,376	16,607,168
Medical Disp./Caregiver Retail (Illicit)	3,652,782	5,978,188	8,303,584
Caregiver w/o Store (Regulated)	2,579,008	4,220,836	5,862,657
Caregiver w/o Store (Illicit)	3,027,531	4,954,894	6,882,250
Free/Bought from Friends/Family (Regulated)	4,997,133	8,178,368	11,359,591
Free/Bought from Friends/Family (Illicit)	4,997,133	8,178,368	11,359,591
Dealer	3,900,201	6,383,117	8,866,022
Home Grow	8,044,165	13,165,178	18,286,171
Other	1,657,586	2,712,825	3,768,060
Illicit	17,235,234	28,207,392	39,179,507
Legal	29,994,986	49,090,158	68,185,254
Total	47,230,219	77,297,549	107,364,761

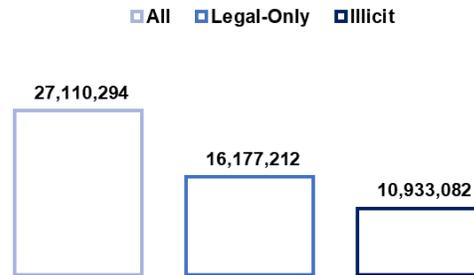
Notably, medical dispensaries, caregiver stores, and caregivers without a store accounted for about 2.34 times the cannabis demand in 2021 than adult-use. Data from other state’s cannabis programs suggest

that it is likely that this proportion will shrink as adult-use sales continue to grow should Maine’s adult-use program match the trajectory seen in states like Colorado¹⁹.

Figure 12 details calculations of 27 million, 16 million, and 11 million grams of cannabis in demand for total medical market, the legal medical market, and the illicit market, respectively.

Figure 12. Estimated Medical Demand Across Legal and Illicit Sources

Illicit, Legal, and Total Medical Demand in Maine in Grams



Increased confidence in the current estimates is derived from concurrently assessing demand for illicit cannabis, home growing, and other sources so as to reduce the odds that the current demand estimates for medical and adult-use cannabis are in any way impacted by a lack of accounting for other sources of demand.

Supply Estimates

Adult-Use Supply Estimates

To arrive at a value for supply, we summed total packaged weight (in grams) of cannabis harvest data supplied through OCP’s seed-to-sale tracking system operated by Metrc. This resulted in a sum of 21.6 million grams of packaged cannabis supply in the adult-use market in Maine in 2021. This metric has been verified by experts as the most accurate existing snapshot within the seed-to-sale system that can depict supply for the adult-use market. As such, we consider the supply estimates of the adult-use market to be a true value.

Adult-Use Demand-to-Supply Estimates

Table 9. Adult-Use Annual Supply vs. Demand (g)

	Supply Grams per Year	Demand Grams per Year (Neutral Estimate)
Adult-Use	21,645,173	11,569,399

Given that our neutral estimate of annual demand for adult-use cannabis was approximately 11.5 million grams, we can derive a demand-by-supply proportion of about 53%. In other words, our analyses suggest approximately 53% of cannabis supply is accounted for by demand. This figure should *not* be interpreted to mean that the 47% of supply that is unaccounted for by demand is flooding the illicit market. Because

¹⁹ [2020-Regulated-Marijuana-Market-Update-Final.pdf \(colorado.gov\)](#)

the total packaged weight refers exclusively to flower, it is the dry harvest amount prior to production of products. When converting flower to products such as edibles or oil, much of the flower weight (g) becomes waste. Because there is no standard conversion for all allowable product types in Maine, and because Metrc tracks different variables for each product type (weight vs. unit), we did not perform a conversion analysis to project supply by product type. Further, we find such an analysis unnecessary considering that the 1:2 ratio is well aligned with other states, validating the finding.

Notably, a little over 2 years after Oregon legalized adult-use cannabis (2019), they reported that demand for adult-use cannabis represented about 50% of supply²⁰. Moreover, a market analysis commissioned by Vermont's Cannabis Control Board in October of 2021 anticipates that approximately 50–90% of supply for their medical and adult-use cannabis markets will be accounted for by demand, presuming proportions at or above the 50% demand-to-supply threshold often reported by other states²¹.

These findings suggest that achieving a 1:2 ratio of demand-to-supply for adult-use cannabis in Maine is very consistent with adaptive proportions achieved and anticipated elsewhere, and that this achievement comes only 1 year after industry standup. Additionally, it is worth noting that these demand figures do not reflect tourism, which supports the idea that 53% capture is conservative considering that Maine has robust seasonal tourism.

Medical Use Supply Estimates

Maine's medical cannabis market does not have requirements for a seed-to-sale tracking system. Because of this, the OCP does not have data on how much cannabis is currently being cultivated by medical sources for the purposes of this report. Given the absence of this verifiable data, finding the true value of supply for the medical market is more challenging and requires assumptions.

After a review of the data sets collected from the medical program, we identified that the Caregiver Registry data is the most insightful data to calculate current medical supply. Table 10 shows the number of active caregivers, inclusive of home-based and caregiver retail storefronts, separated based on the number of mature/immature plants they are permitted to grow under their registration. This total is 3,007, not including 2 registrations for LVL 0, which have been removed as the plant count is 0 for those 2 registrants. The proceeding table and analysis does not include medical dispensary data.

²⁰ Oregon Liquor Control Commission. (2019, January 31). *2019 Recreational marijuana supply and demand legislative report*. [https://www.oregon.gov/olcc/marijuana/Documents/Bulletins/2019%20Supply%20and%20Demand%20Legislative%20Report%20FINAL%20for%20Publication\(PDFA\).pdf](https://www.oregon.gov/olcc/marijuana/Documents/Bulletins/2019%20Supply%20and%20Demand%20Legislative%20Report%20FINAL%20for%20Publication(PDFA).pdf)

²¹ Vermont Cannabis Control Board. (2021, October 15). *Report to the House Committee on Ways and Means, the Senate Committee on Finance, and the House and Senate Committees on Government Operations as per Sections 4a, 11, & 13 of Act 62 (2021)*. https://ccb.vermont.gov/sites/ccb/files/2021-11/Vermont_CCB_Report_Oct_15_2021-1.pdf

Table 10. Active Registered Caregivers by Grow Limits (January 2022)

Grow Level	Grow Limit	Registrants
LVL 1	6 Mature/12 Immature	381
LVL 2	12 Mature/24 Immature	145
LVL 3	18 Mature/36 Immature	103
LVL 4	24 Mature/48 Immature	76
LVL 5	30 Mature/60 Immature	1,059
LVL 6	Plant Canopy (500 sq ft)	1,243
	State Total:	3,007

Standard Plant/Pounds Ratio Estimate. The next step entails multiplying the grow limit for mature plants by the number of active registrants at each grow level to identify the total plant capacity of each grow level. However, because LVL 6 deviates from the definitive plant count variable, and instead uses a plant canopy of 500 square feet with allowances to grow however many mature plants desired/possible within that plot of land, we first identify the average amount of mature plants being cultivated by registrants from this category.

Prior to June 2021²², Maine’s Medical Use of Marijuana Act required registered caregivers to report their mature plant counts to OCP upon time of registration or renewal. As such, OCP was able to pull the latest report from 2021 to identify the average amount of plants being cultivated in LVL 6. This resulted in approximately 300 LVL 6 registrants self-reporting to be cultivating an average of 76.54 plants. Because this is the most reliable and defensible data available, we assume that the average total mature plant count for LVL 6 is 76.54.

Table 11. Mature Plant Potential Total by Grow Level

Grow Level	Grow Limit	Registrants	Mature Plants
LVL 1	6 Mature/12 Immature	381	2,286
LVL 2	12 Mature/24 Immature	145	1,740
LVL 3	18 Mature/36 Immature	103	1,854
LVL 4	24 Mature/48 Immature	76	1,824
LVL 5	30 Mature/60 Immature	1,059	31,770
LVL 6	Plant Canopy (500 sq ft)	1,243	95,139
	State Total:	3,007	134,613

For LVL6, we multiplied 1,243 (# of registrants) by the average total mature plant count of 76.54 per registrant, arriving at a total of 134,613 mature plants supplied by all registered caregivers.

The next step of this analysis is to identify the average plant per pound of mature plants, and the average harvest cycles to calculate the total pounds of cannabis supply. Because we do not have seed-to-sale data for the mature plants, we do not know the

²² An Act to Make Technical Changes to the Maine Medical Use of Marijuana Act, S.P. 295 - L.D. 881 (2021). <http://www.mainelegislature.org/legis/bills/getPDF.asp?paper=SP0295&item=3&snum=130>

average harvest number nor the weight of each harvest. Additionally, we do not have insight into how many caregivers are cultivating outdoors, which would result in a lower number of harvests and would change findings significantly. As such, we use a sensitivity analysis of annual harvest cycles to compare two plant/pound ratios. The first analysis uses the commonly cited conservative estimate of 1.33 plants per pound ratio²³, as seen in Table 11. It is then followed by an analysis using an average of 0.64 plants per pound. This second ratio comes from the adult-use program’s tracking system and is therefore a defensible liberal estimate for comparison.

Table 12. 1.33 Plants per Pound Annual Grams by Harvest Cycle Sensitivity Analysis

Grow Level	Grow Limit	Regist-rants	Mature Plants	Lbs	Grams per Harvest	Annual Grams (x 4 harvest cycles)	Annual Grams (x 3 harvest cycles)	Annual Grams (x 2 harvest cycles)
LVL 1	6 Mature/ 12 Immature	381	2,286	1,719	779,629	3,118,517	2,338,887	1,559,258
LVL 2	12 Mature/ 24 Immature	145	1,740	1,308	593,418	2,373,674	1,780,255	1,186,837
LVL 3	18 Mature/ 36 Immature	103	1,854	1,394	632,298	2,529,191	1,896,893	1,264,595
LVL 4	24 Mature/ 48 Immature	76	1,824	1,371	622,066	2,488,265	1,866,199	1,244,133
LVL 5	30 Mature/ 60 Immature	1,059	31,770	23,887	10,835,003	43,340,013	32,505,010	21,670,006
LVL 6	Plant Canopy (500 sq ft)	1,243	95,139	71,533	32,446,691	129,786,764	97,340,073	64,893,382
	State Total:	3,007	134,613	101,213	45,909,106	183,636,423	137,727,317	91,818,212

As Table 12 shows, when assuming 1.33 plants per pound of cannabis, there is an estimated 183 million grams of medical cannabis supply from caregivers assuming 4 harvest cycles, 137 million grams of medical cannabis supply assuming 3 harvest cycles, and 92 million grams of medical cannabis supply assuming 2 harvest cycles.

Table 13 below shows estimates of medical cannabis supply assuming a plant-to-pound ratio of 0.64, as is provided by Maine’s OCP, reflecting the average ratio for the adult-use system. Using that ratio, we estimate 383 million grams of medical cannabis supply assuming 4 harvest cycles, 287 million grams of medical cannabis supply assuming 3 harvest cycles, and 191 million grams of medical cannabis supply assuming 2 harvest cycles.

²³ Hudak, J., Freedman, A., & Koski, L. (2019, February). *A Snapshot of demand for adult-use cannabis in Illinois*. <https://www.scribd.com/document/433582824/A-Snapshot-of-Demand-for-Adult-use-Cannabis-in-Illinois>

Table 13. 0.64²⁴ Plants per Pound Annual Grams by Harvest Cycle Sensitivity Analysis

Grow Level	Grow Limit	Registrants	Mature Plants	Lbs	Grams per Harvest	Annual Grams (x 4 harvest cycles)	Annual Grams (x 3 harvest cycles)	Annual Grams (x 2 harvest cycles)
LVL 1	6 Mature/12 Immature	381	2,286	3,589	1,628,053	6,512,212	4,884,159	3,256,106
LVL 2	12 Mature/24 Immature	145	1,740	2,732	1,239,200	4,956,801	3,717,601	2,478,400
LVL 3	18 Mature/36 Immature	103	1,854	2,911	1,320,389	5,281,556	3,961,167	2,640,778
LVL 4	24 Mature/48 Immature	76	1,824	2,864	1,299,024	5,196,096	3,897,072	2,598,048
LVL 5	30 Mature/60 Immature	1,059	31,770	49,882	22,626,086	90,504,344	67,878,258	45,252,172
LVL 6	Plant Canopy (500 sq ft)	1,243	95,139	149,378	67,756,475	271,025,900	203,269,425	135,512,950
	State Total:	3,007	134,613	211,356	95,869,227	383,476,908	287,607,681	191,738,454

Total Estimated Medical Cannabis Supply. If we average the estimates across both plants per pound ratios (i.e., 1.33 and 0.64) and all three harvest options (i.e., 2, 3, or 4 harvests), we arrive at a total estimated medical supply in Maine of approximately 212,667,499 grams annually.

There are important caveats to this figure:

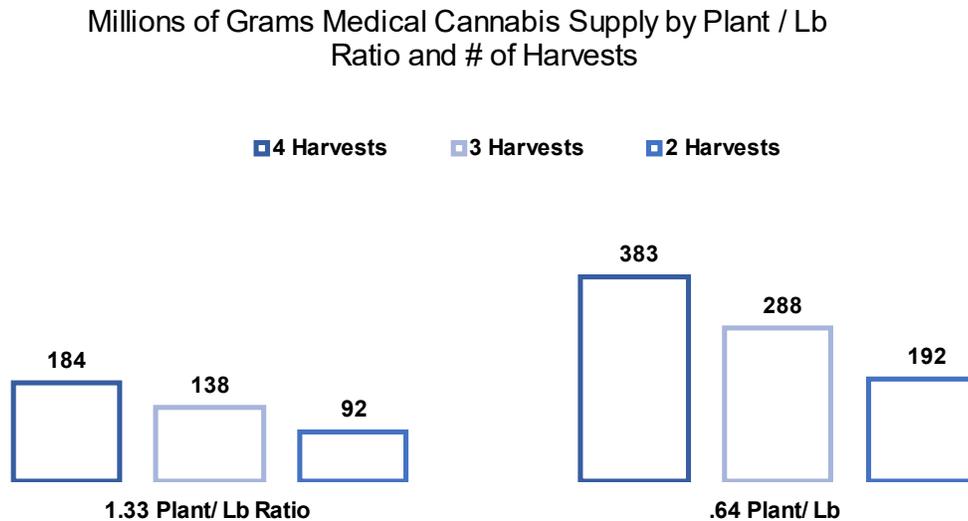
- This assumes that grow levels 1–5 are growing at full capacity, while grow level 6 is only at 15% capacity.
- We arrive at this capacity determination by using the standard ratio of 1 plant per square foot.
- This leads us to assume that a 500 sq ft canopy could ultimately allow for approximately 500 plants.
- To understand how much of this square footage is being used for mature plants, we conducted the analysis using the 2021 data described in the section above, leading to the average of 76.54 mature plants.
- This leads us to conclude that, if we assume 500 sq ft allows for up to 500 plants, and all of those plants are allowed to be mature per Maine law, then only 15% of capacity for this grow level is being used.

While it is unlikely that each grow level is growing their maximum number of mature plants allowed (i.e., full capacity) we account for this in our total calculation. In summary, because grow level 6 includes only 15% capacity *and* represents the vast majority of the mature plants in the program, the total capacity of

²⁴ Note that the exact value was .6369 for this plant per pound ratio, and was a value derived from median plant harvest weight from adult-use system provided by the inventory tracking system.

the program is brought down to approximately 40%. Although the allowable mature plants for grow levels 1–5 may not be 100% utilized, the estimate of 134,613 mature plants *does not* account for supply that is used for medical dispensaries in Maine, thus suggesting there is very likely a higher supply of plants produced than our estimate. This concession, combined with the weighted 40% capacity, provides a particularly conservative estimate of medical supply in total.

Figure 13. Medical Cannabis Supply by Plant/Lb Ratio and # of Harvests



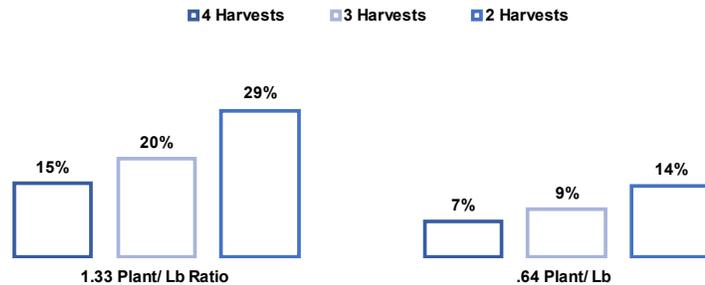
All Medical Use Demand-to-Supply Ratio

Our survey demonstrated the following:

Figure 14. Medical Demand-to-Supply Ratio by Plant/Lb Ratio and # of Harvests

- Medical dispensary and caregiver store demand accounted for 17,934,563 grams of cannabis.
- Caregivers without a store demand accounted for 9,175,730 grams
- There was a total of 27,110,294 grams of medical cannabis demand in Maine.

Medical Cannabis Demand to Supply Ratio by Plant / Lb Ratio and # of Harvests



To determine the demand-to-supply ratio of medical cannabis in Maine, we simply took the medical demand estimates from the survey (27 million grams) divided by the total estimated medical supplies by harvest for the 1.33 plant/lb ratio (i.e., 184, 138, and 92 million grams) and the 0.64 plant/lb ratio (i.e., 383, 288, and 192 million grams), and took the average demand-to-supply ratio derived from those 6 calculations to arrive at a final demand-to-supply ratio.

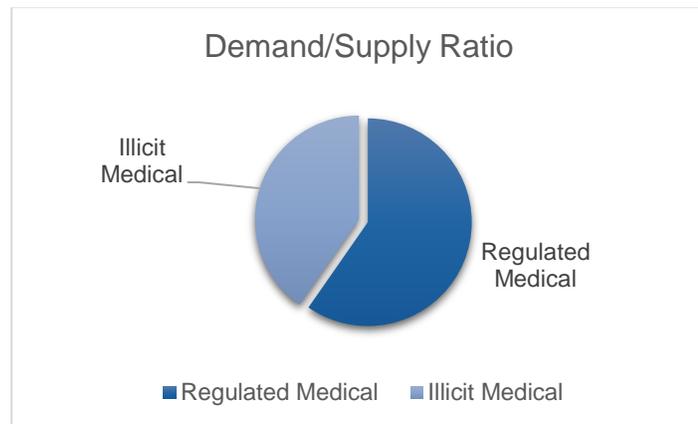
These calculations led to a demand-to-supply ratio of 16% for the total medical market.

Note that this percent includes demand and supply figures considered to be illicit based on survey findings described on page 9 of this report. This percentage is broken out to reflect the true demand-to-supply ratio of the regulated medical market, and the demand-to-supply ratio of the illicit medical market as follows:

Regulated Medical Market: 9.4%

Illicit Medical Market: 6.4%

Figure 15. Demand to Supply Ratio of Medical Cannabis by Illicit vs Regulated



Comparing Medical and Adult-Use Demand-to-Supply Ratios

As discussed earlier, the calculated adult-use demand-to-supply ratio was 53%. When taking the average of all medical demand-to-supply estimates, we arrive at a total of 16% demand-to-supply ratio, which is approximately one third less than the ratio for adult-use. Conversely, there are 2 grams of cannabis supply for every 1 gram of cannabis in demand for the adult-use market.

Just as noted with the adult-use demand-to-supply ratio, the finding of 16% of supply accounted for by demand in the medical program should *not* be interpreted to mean that 84% of cannabis, or 6 grams for every 1 gram, is being funneled to the illicit market. Although some of the excess medical cannabis

supply will be accounted for by waste throughout the supply chain, a notable portion of the 84% of excess supply is unaccounted for. Further, the medical cannabis market in Maine has been active for over ten years, making the 6:1 ratio an anomaly to trends observed in other states. Typically, as states progress in their timeline post market legalization for medical or adult-use, the demand-to-supply ratio decreases as efficiencies are met.

Confidence in the Findings

The above market analyses of cannabis supply are estimates calculated based on several documented and defensible assumptions. In addition, several critical aspects of these analyses increase confidence in our findings on supply and demand.

- First, although we accounted for demand for cannabis from medical dispensaries, medical caregiver stores, and caregivers without a store, we did not have supply data available for medical cannabis dispensaries. By omitting any inferred amount of supply that goes to medical cannabis dispensaries while keeping all medical demand sources, we take a much more conservative estimate for the medical cannabis demand-to-supply ratio, thus increasing the odds that the supply estimates for medical cannabis are likely higher than reported here.
- Second, the current estimates average 2–4 harvests per year (i.e., 3 harvests), which is likely a conservative estimate given that the majority of growers in Maine grow and harvest cannabis indoors, where 4–5 harvests are typical on average.
- Third, the exact same format of demand questions was used to ascertain adult-use and medical cannabis demand at the same point in time, thus reducing potential confounding issues related to different data sources and different timepoints of assessment.
- Fourth, and lastly, the inference that there is much more supply relative to demand for the medical market relative to the adult-use market is strengthened by the fact that thousands of data points were used to calculate both supply and demand for these markets. Therefore, the odds that a difference of 53% (adult-use) relative to 16% (medical) is not substantial is quite low.

State Supply and Demand Benchmarks

Although it appears clear that the medical cannabis market in Maine shows much greater supply relative to demand compared to the adult-use market, it is difficult to identify the extent to which such proportions deviate from benchmarks produced by other legal cannabis states. However, publicly available data from Colorado, Oregon, and Vermont cannabis markets suggest that Maine's medical demand-to-supply ratio of 16% is abnormal and likely indicative of an oversupply. For example, an independent analysis of Colorado supply and demand aggregated across both markets suggests 63% of cannabis supply is accounted for by demand²⁵. Another example comes from Oregon, where the first adult-use cannabis

²⁵ MPG Consulting & Leeds School of Business, University of Colorado Boulder. (2020). *2020 Regulated marijuana market update*. Colorado Department of Revenue, Marijuana Enforcement Division. <https://sbg.colorado.gov/sites/sbg/files/2020-Regulated-Marijuana-Market-Update-Final.pdf>

store opened in late 2016. One year after adult-use implementation in Oregon (mirroring Maine's status in the current report), Oregon estimated an approximately 50% demand-to-supply ratio for their adult-use market²⁶. About three and a half years after Oregon implemented adult-use, that proportion of demand to supply in their adult-use market rose to 64%²⁷. Vermont's Cannabis Control Board released a report in late 2021 wherein they projected a demand-to-supply ratio across both markets between 50% and 90% (i.e., between 1:2 and 9:10 ratios)²⁸. Lastly, Massachusetts, which implemented its adult-use cannabis law the year before Maine did, was projected 2 years after adult-use implementation to potentially have greater demand than supply, which strongly suggests that their demand-to-supply ratio was much higher than the 16% found for Maine's medical cannabis system²⁹. All of the state programs mentioned in this section have requirements for an inventory tracking system, which further verifies the validity of these reports.

While individual differences across states make direct state-to-state comparisons challenging, the preponderance of evidence strongly suggests that Maine's medical cannabis demand-to-supply ratio is comparatively very low, while its adult-use demand-to-supply ratio is consistent with the records and projections of previous and current adult-use markets in other states.

²⁶ Oregon Liquor Control Commission. (2019, January 31). *2019 Recreational marijuana supply and demand legislative report*.

<https://www.oregon.gov/olcc/marijuana/Documents/Bulletins/2019%20Supply%20and%20Demand%20Legislative%20Report%20FINAL%20for%20Publication%28PDF%29.pdf>

²⁷ Oregon Liquor Control Commission. (2021, February 1). *2021 Recreational marijuana supply and demand legislative report*. https://www.oregon.gov/olcc/Docs/Legislative_docs/2021-Supply-and-Demand-Report.pdf

²⁸ Vermont Cannabis Control Board. (2021, October 15). *Report to the House Committee on Ways and Means, the Senate Committee on Finance, and the House and Senate Committees on Government Operations as per Sections 4a, 11, & 13 of Act 62 (2021)*. https://ccb.vermont.gov/sites/ccb/files/2021-11/Vermont_CCB_Report_Oct_15_2021-1.pdf

²⁹ Schaneman, B. (2020, March 16). Wholesale cannabis flower prices in Massachusetts climb on mounting demand, sluggish supply. *MJBizDaily*. <https://mjbizdaily.com/wholesale-cannabis-flower-prices-massachusetts-climb-on-mounting-demand/>

Appendix A: Survey Questions

Maine Cannabis Survey Questions

Start of Block: Intro

Information Statement

Hello,

The following survey is being conducted in by Advocates for Human Potential, Inc. and the State of Maine, Office of Marijuana Policy. The goal of the study is to better understand patterns, choices, preferences, and attitudes regarding cannabis among residents in Maine. You do not have to have used cannabis before to participate in this survey. To participate in this study, we require that you are currently in Maine, at least 21 years of age, and agree to participate in our study. No identifying or personal information will be collected about you and you can stop or close out of the survey at any time.

Please know that there no right or wrong answers to our survey questions, so please answer as honestly as possible. The survey will only take approximately 10 minutes, and will ask questions about demographics (e.g., age, gender), your opinions on cannabis use policies at the federal level and local level, and about your patterns and preferences related to cannabis use.

Thank you for your time!

Page Break

AgreetoParticipate Do you agree to participate in the current study?

Yes (1)

No (2)

Skip To: End of Block If AgreetoParticipate != 1

Age How old are you in years?

- 17 or younger (1)
- 18-20 (2)
- 21-30 (3)
- 31-40 (4)
- 41-50 (5)
- 51-60 (6)
- 61-70 (7)
- 71-80 (8)
- 81-99 (9)

Skip To: End of Block If Age = 1

Skip To: End of Block If Age = 2



Q48 What is the zip code (5 digits) for your place of residence?

Skip To: End of Block If Condition: What is the zip code (5 dig... Is Less Than 03901. Skip To: End of Block.

Skip To: End of Block If Condition: What is the zip code (5 dig... Is Greater Than 04992. Skip To: End of Block.

Page Break

To help ensure that you are not a robot, please type in the letter and number shown on the lemon.

End of Block: Intro

Start of Block: Demographics

Educ What is the highest grade or year of school that you have completed?

▼ Never attended school (1) ... Doctoral degree (11)

Gender Please indicate your gender

▼ Male (1) ... Decline to answer (7)

Race Which race best describes you? (Please check all that apply)

- American Indian or Alaskan Native (1)
- Asian (2)
- Black or African American (3)
- White (4)
- Native American (5)
- Native Hawaiian or other Pacific Islander (6)

Page Break

Hispanic Which ethnicity best describes you? (Select only one)

- Hispanic or Latino (1)
 - Not Hispanic or Latino (2)
-

Q52 How many days did you use alcohol in the past month?

- 0 Days (1)
 - 1-2 Days (2)
 - 3-5 Days (3)
 - 6-9 Days (4)
 - 10-19 Days (5)
 - 20-24 Days (6)
 - 25-29 Days (7)
 - All 30 Days (8)
-

Page Break

Q54 How many days did you use tobacco in the past month?

- 0 Days (1)
 - 1-2 Days (2)
 - 3-5 Days (3)
 - 6-9 Days (4)
 - 10-19 Days (5)
 - 20-24 Days (6)
 - 25-29 Days (7)
 - All 30 Days (8)
-

Q58 Please note that when we ask any questions about cannabis in this survey, we are not referring to hemp.

- I understand (1)

Q38 When was the last time that you used cannabis?

- In the past week (1)
- In the past month (2)
- In the past three months (3)
- In the past six months (4)
- In the past year (5)
- Never (6)

End of Block: Demographics

Start of Block: Past Month Users

Q36 If the federal government in the U.S. legalizes adult cannabis use, how important is it to you that they allow states to craft and enforce their own cannabis policies, just as states do with alcohol?

- Not important at all (1)
- Somewhat important (2)
- Very important (3)

UseinPublic If the federal government in the U.S. legalizes adult cannabis use, should use of cannabis in public spaces be allowed?

- Not in any public places (1)
- In some places (2)
- In all public places (3)

Page Break

CertifiedPatient Do you currently have a patient certification in Maine?

- No (1)
- Yes (2)

Page Break

RegisteredCaregiver Are you currently a registered caregiver in Maine's medical cannabis program?

- No (1)
- Yes (2)

Page Break

DriveUnderInfluence Have you driven a motor vehicle within two hours of using cannabis in the last year?

- No (1)
- Yes (2)

Q42 How much of your own cannabis do you cultivate?

▼ I do not cultivate my own cannabis (1) ... 11 or more Plants (12)

Q31 Think about the last time you wanted to access cannabis. Please rank below the importance of each characteristic that impacted your decision from first (#1) to last (#6).

- _____ Price (1)
- _____ THC or CBD potency (2)
- _____ Source (example: adult use store vs. buying from friend) (3)
- _____ Cannabis strain (4)
- _____ Safety (example: tested for potential contaminants) (5)
- _____ Convenience (time, distance or access) (6)

Page Break

Q43 Please reference the image below when answering questions about your consumption amount in grams.

AmountCannSources In the past month, how many grams of cannabis did you obtain each week from the following sources?

	0 Grams (1)	Less than 1 gram (2)	1-3 Grams (3)	4-10 Grams (4)	11-15 Grams (5)	16 or More Grams (6)
Adult use store (1)	<input type="radio"/>					
Medical dispensary or caregiver retail store (2)	<input type="radio"/>					
Home-based caregiver or caregiver without a store (3)	<input type="radio"/>					
Given for free or purchased from friends and family (4)	<input type="radio"/>					
Bought from dealer (5)	<input type="radio"/>					
Took from my own home grow (6)	<input type="radio"/>					
Other (Please write answer below) (8)	<input type="radio"/>					

Page Break

SpendingonCannSource In the past month, how much did you spend per gram of cannabis from each of the following sources?

	I don't buy from this source (1)	\$0 (2)	\$1-4 (4)	\$5-7 (5)	\$8-10 (6)	\$11-14 (7)	\$15-19 (8)	\$20-24 (9)	\$25 or more (10)
Adult use store (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical dispensary or caregiver retail store (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home-based caregiver or caregiver without a store (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given for free or purchased from friends and family (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bought from dealer (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took from my own home grow (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (Please write answer below) (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

UsingCraftCann Do you use "craft" cannabis?

No (1)

Yes (2)



DefiningCraftCann In one sentence, how do you define craft cannabis?

Page Break

THC potency

What is the typical potency (**THC**) of the cannabis that you have used in the **past month**? You may not know exactly, but please give it your best guess.

- Less than 10% (1)
 - Between 10-15% (2)
 - Between 15-20% (3)
 - Between 20-25% (4)
 - Between 25-35% (5)
 - Between 35-50% (6)
 - Over 50% (7)
 - I have no idea (8)
-

HowKnowTHCCBD How do you figure out how much THC and CBD are in your cannabis?

- I don't know how much THC or CBD is in my cannabis (1)
 - Adult use store, medical dispensary, or medical caregiver staff tell me (2)
 - Labels from adult use store, medical dispensary or caregiver retail store (3)
 - Dealer, friends, or family members tell me (4)
 - I research the strain online (5)
 - I test on my own (9)
-

Page Break

Methods of Use

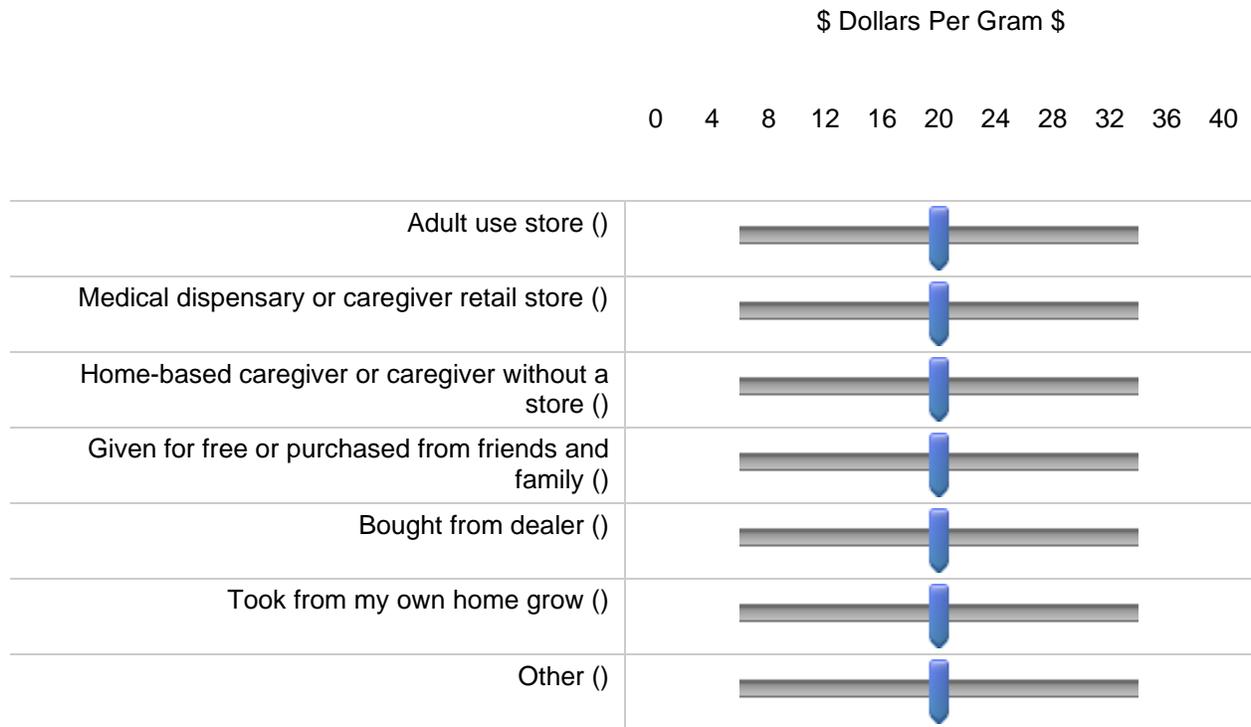
Please tell us about the ways or methods that you have used cannabis ***in the past month*** by checking the boxes below.

	Did Not Use Last Month (1)	Used Last Month (2)
Smoked/dried herb or flower (1)	<input type="radio"/>	<input type="radio"/>
Concentrates (butane, honey oil, butter, shatter, etc.) (2)	<input type="radio"/>	<input type="radio"/>
Edibles (3)	<input type="radio"/>	<input type="radio"/>
Drinks (4)	<input type="radio"/>	<input type="radio"/>
Topicals (5)	<input type="radio"/>	<input type="radio"/>
Tinctures (7)	<input type="radio"/>	<input type="radio"/>
Lozenges (8)	<input type="radio"/>	<input type="radio"/>
Creams, balms, or sprays (9)	<input type="radio"/>	<input type="radio"/>
Other (10)	<input type="radio"/>	<input type="radio"/>

Page Break

WillingtoPaySources

Please tell us how much ***you are willing to spend per gram*** of medium-quality cannabis from the following sources.



ExpProblemsCannMed

Have you experienced problems in obtaining cannabis **for your medical needs?**

- No (1)
- Yes, there is often a lack of stock at the dispensary (2)
- Yes, it is too expensive for me (3)
- Other (4) _____
- I have not purchased cannabis for medical needs (5)

Page Break _____

Cann_Past30_Days

How many days have you used cannabis in the past month?

- 0 Days (1)
- 1-2 Days (2)
- 3-5 Days (3)
- 6-9 Days (4)
- 10-19 Days (5)
- 20-25 Days (6)
- 26-29 Days (7)
- All 30 Days (8)

Page Break

TotalGramsLastMonth

How many TOTAL grams of cannabis across all methods did you typically use **per week** in the last

month? You may not know exactly, but please give it your best guess.

- Less than 1 gram (1)
- 1-2 grams (2)
- 3-5 grams (3)
- 6-10 grams (4)
- 11-15 grams (5)
- 16-20 grams (6)
- More than 20 grams (7)

Page Break

AcuteCannSymptoms Please indicate if you have had any of the following experiences immediately after using cannabis (select all that apply).

- It causes nausea or vomiting (1)
- It helps me get through the day (10)
- It relieves stress, anxiety, or depression (14)
- It causes headaches or migraines (3)
- It makes me feel more focused, aware, or enhances my thinking. (13)
- It causes elevated anxiety or nervousness (4)
- It helps me socially (15)
- It gives me suicidal thoughts (5)
- It helps me treat symptoms of issues other than stress, anxiety, and depression (7)
- It gives me psychotic or paranoid feelings (16)
- General feelings of relaxation (18)
- It helps me feel good or have fun (9)
- None of the above (6)

End of Block: Past Month Users

Start of Block: ChangeinSource

ChangeinCannSource Have you changed where you get your cannabis *in the last month*? For each source of cannabis, please indicate whether you now get more, less, or the same amount of cannabis from that source.

	More (1)	Less (2)	Same (3)	Never gotten from Source (4)
Adult use store (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical dispensary or caregiver retail store (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given for free or purchased from friends and family (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home-based caregiver or caregiver without a store (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bought from dealer (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took from own home grow (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

Q56 Have you changed where you get your cannabis since January of 2021? For each source of cannabis, please indicate whether you now get more, less, or the same amount of cannabis from that source.

	More (1)	Less (2)	Same (3)	Never gotten from Source (4)
Adult use store (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical dispensary or caregiver retail store (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Given for free or purchased from friends and family (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home-based caregiver or caregiver without a store (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bought from dealer (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took from own home grow (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: ChangeinSource

Start of Block: CUDandQoF

CUDSF-1

How often during the past 6 months did you find that you were not able to stop using cannabis once you had started?

- Not Applicable, did not try to stop (1)
 - Less than monthly (2)
 - Monthly (3)
 - Weekly (4)
 - Daily or almost daily (5)
-

CUDSF-2

How often in the past 6 months have you devoted a great deal of your time to getting, using, or recovering from cannabis?

- Never (1)
 - Less than monthly (2)
 - Monthly (3)
 - Weekly (4)
 - Daily or almost daily (5)
-

CUDSF-3

How often in the past 6 months have you had a problem with your memory or concentration after using cannabis?

- Never (1)
- Less than monthly (2)
- Monthly (3)
- Weekly (4)
- Daily or almost daily (5)

Page Break

End of Block: CUDandQoF

Start of Block: Govtrust&QoL

SchedOpin How important is it for you that the federal government removes cannabis from the Controlled Substances Act which would end federal prohibition of cannabis?

- Not important at all (1)
- Somewhat important (2)
- Very important (3)

Q35 How important is it for you that the federal government expunge federal records of arrests and convictions for non-violent cannabis offenses?

- Not important at all (1)
- Somewhat important (2)
- Very important (3)

Page Break

Q38 How would you rate your quality of life?

- Very poor (1)
- Poor (2)
- Neither poor nor good (3)
- Good (4)
- Very good (5)

End of Block: Govtrust&QoL

Start of Block: Non-Past Month Users

Q38 Which of the following reasons influence your decision to not use cannabis at least monthly (Select all that apply)?

- It makes me feel worse (1)
 - I am worried about it negatively affecting my job (2)
 - It is illegal federally (3)
 - I think it can be addictive (4)
 - I think it is morally wrong (5)
 - Other (Please fill in the text below) (6)
-

Q39 Which of the following priorities of cannabis laws and regulations in Maine are important to you (Please select all that apply)?

- Keeping cannabis out of the hands of youth (1)
 - Making sure cannabis is safe and clean (2)
 - Minimizing illicit use and attendant criminal activity (4)
 - Driving under the influence of cannabis (7)
 - Other (8) _____
-

Q40 Based on what you know about cannabis laws and regulations in Maine, which of the following options do you agree with the most?

- Cannabis is not regulated enough in Maine (1)
- Cannabis is too regulated in Maine (2)
- Cannabis is regulated just the right amount (3)

Page Break

Q41 What is the likelihood you will use cannabis in the next year?

- Very unlikely (1)
- Unlikely (2)
- Not sure (3)
- Likely (4)
- Very likely (5)

Q49 How important do you think it is that those who use cannabis in Maine purchase it from legal sources that provide tax revenue to the State of Maine?

- Not Important (1)
- Somewhat Important (2)
- Important (3)
- Very important (4)

Page Break



Q51 What do you think separates frequent cannabis users who purchase cannabis legally and those who do not?

Q43 If you were to use cannabis in the future, from which of the following sources would you get your cannabis (Select all that apply)?

- Adult use store (1)
- Medical dispensary or caregiver retail store (2)
- Home-based caregiver or caregiver without a store (3)
- Get for free or purchased from friends and family (4)
- Buy from dealer (5)
- Take from my own home grow (6)
- Other (Please write answer below) (8)

- I will never use cannabis in the future (9)

Page Break _____



Q45 What is one thing you would like to see Maine's **medical cannabis program** do differently in the future?



Q47 What is one thing you would like to see Maine's **adult use cannabis program** do differently in the future?

Page Break

Q44 How beneficial or harmful do you think Maine's **medical cannabis law** is for your local community in Maine?

- Very harmful (1)
 - Harmful (4)
 - Neutral (5)
 - Beneficial (6)
 - Very beneficial (7)
-

Q55 Please explain which factors influence your answer to the previous question about the medical cannabis law in Maine.

Q54 How beneficial or harmful do you think Maine's **adult use cannabis law** is for your local community in Maine?

- Very harmful (1)
- Harmful (4)
- Neutral (5)
- Beneficial (6)
- Very beneficial (7)

Page Break

Q56 Please explain which factors influence your answer to the previous question about the adult use cannabis law in Maine.

End of Block: Non-Past Month Users

Appendix B: Everyday Definitions of Terms

Cannabis Use Disorder: A diagnosis consistent with symptoms indicating problematic cannabis use that results in a loss of control over use, memory and concentration issues, and cannabis use that negatively impacts one's functioning (e.g., work, relationships)³⁰.

Correlation: A statistical reflection of the relationship between two variables (e.g., ice cream sales are correlated with higher temperatures).

Demand: Data such as cannabis sales or total weight of cannabis purchased or accessed that reflects the overall desire or interest of a group or population in a product.

Demand-to-Supply Ratio: The calculated total demand divided by the calculated total supply.

Number of Harvests: Refers to the number of instances per year a crop of cannabis can be cultivated.

Illicit Cannabis: Generally considered cannabis purchased outside of a context that is legal sanctioned by a government entity.

Market Source: For cannabis, it typically reflects the sales context in which cannabis was accessed (e.g., adult-use, medical, illicit, home grow, etc.).

Plants/Pound Ratio: A statistic used to convert plants produced into pounds, which can then be translated into grams for ease of understanding.

Sensitivity Analysis: A follow-up statistical analysis that is similar to an earlier analysis, but that is different enough to provide added support and confidence in the original finding.

State vs. Substate: Referencing a state signifies the state as a whole (i.e., Maine), whereas a substate region could reflect a ZIP code, county, or other geographic areas within a given state.

Supply: The amount of product like cannabis produced with the general purpose of being sold to consumers.

Validate: Validating a study finding means that additional analyses or events are referenced that support an initial position or argument.

Weighted for Cannabis Use: When sampling for cannabis demand, it is best practice to ensure the sample has more cannabis users than not as to ensure that the total grams of demand is accurate. When this term is used, it simply means the sample collection included methods that ensured cannabis users

³⁰ [Cannabis Use Disorder and Its Treatment | SpringerLink](#)

were represented in the study, and because of this, may include more cannabis users than if selected at random.

Willingness to Pay: Willingness to pay questions ask participants to provide an estimate of how much they would be willing to pay for a specific amount of a given commodity (e.g., a gram of cannabis from an adult use store). It is used to provide data on pricing and market insights across cannabis and other industries.

Appendix C: Overview of Methodological Decisions and Rigor

The current sample of individuals who use cannabis in the past month from Maine represents a margin of error at 4% at a confidence interval of 95%³¹, both of which are within recommended ranges for population studies. In other words, if we repeated the survey of 1,129 Maine residents who use cannabis in the past month 100 times in a row, 95% of the time the sample proportion we achieved would be 4% points or less from the true population prevalence³². These findings provided additional confidence that sample recruited for this study corresponds well to the actual population of individuals in Maine who use cannabis in the past month.

The sample from the state-wide survey and sub-state surveys both showed a strong match in demographic characteristics relative to those of population of Maine. Such representativeness improves our confidence that findings reported in the state-wide survey are fairly indicative of those seen in the general population³³. In other words, the odds that our estimates are inaccurate due to differences in the demographics of our samples relative to that of true population of Maine is very low.

Throughout the demand and supply estimates, multiple estimates of supply and demand metrics were calculated and referred to as sensitivity analyses. Sensitivity analyses are a scientific form of answering “What-if” questions in regard to whether certain assumptions or calculations of a quantitative estimate are valid. For example, in the supply calculations for Figure 14 (pg. 26), we provide several estimates of demand to supply ratios based on varied numbers of assumed harvest and varied plant count-to-pounds equivalences. Because assumptions regarding how many harvests and the size of the plant-to-pound ratio directly impact the calculated demand to supply ratios, and because all of the demand-to-supply ratios were still below what would be anticipated, these sensitivity analyses considerably increase our confidence that demand to supply ratio for the medical market is relatively low.

The overarching methods employed for the current survey studies are supported by the publication of over 10 peer-reviewed, scientific studies or reviews that were authored by the principal investigator of this

³¹ [Sample size calculator - CheckMarket](#)

³² [Erring on the Margin of Error \(wiley.com\)](#)

³³ [Assessing sample representativeness in randomized controlled trials: application to the National Institute of Drug Abuse Clinical Trials Network - Susukida - 2016 - Addiction - Wiley Online Library](#)

report, Dr. Michael Sofis^{34,35,36,37,38,39,40,41,42,43,44,45,46}. Many of the cannabis survey questions used in the current study were validated or further validated by Dr. Sofis in studies where he led the online recruitment of thousands of individuals who use cannabis to study patterns of cannabis use. Many of the items used in this survey are supported by their use in one of Dr. Sofis' cannabis publications or have been validated prior to their use in federal surveys such as our survey question probing past month frequency of cannabis use days derived from the National Survey on Drug Use and Health (NSDUH). Dr. Sofis' published scientific work on cannabis includes successfully predicting future cannabis use outcomes²⁸, examining the impacts of cannabis legalization on cannabis-related outcomes^{25,26}, and leading or assisting in the recruitment, data collection, analysis, write-up, and interpretation of large national or state studies of cannabis use patterns, products, and trends^{22,34}. In addition, he has led a cannabis demand study commissioned by the State of New Mexico, used to defend plant limit regulations set by the State. In 2022 alone, Dr. Sofis has led the collection and analysis of demand data of 5,500 individuals who use cannabis as a function of market source (e.g., adult-use, medical, illicit, home grow, etc.) for 20 U.S. states, eight of which have already implemented adult-use cannabis. Through these experiences, Dr. Sofis has led the collection and analysis of data on the frequency, amount, product, potency, and/or severity of cannabis use for approximately 35,000 individuals dispersed across every state in the United States.

Like other population studies, it is impossible to be 100% confident in the “true” value of any of the outcomes assessed here or in any scientific or state-commissioned population study. To do so would require surveying or acquiring data from literally every relevant individual in the area of interest (e.g., state or country). However, there are several steps and evaluation methods that can help strongly increase confidence in the veracity and quality of the findings.

Examples of these approaches used, and evidence supporting the validity of our methods, are noted here:

- Best practices in using previously empirically supported survey items²²⁻³².

³⁴ [Associations of cannabis product source and subsequent cannabis use among adolescents - ScienceDirect](#)

³⁵ [Characterizing cannabis use reduction and change in functioning during treatment: Initial steps on the path to new clinical endpoints. - PsycNET \(apa.org\)](#)

³⁶ [Sifting through the weeds: Relationships between cannabis use frequency measures and delay discounting - ScienceDirect](#)

³⁷ [An update on cannabis use disorder with comment on the impact of policy related to therapeutic and recreational cannabis use | SpringerLink](#)

³⁸ [The Importance of Psychology for Shaping Legal Cannabis Regulation - PMC \(nih.gov\)](#)

³⁹ [Correlates of continued cannabis use during pregnancy - ScienceDirect](#)

⁴⁰ [Evaluating cannabis use risk reduction as an alternative clinical outcome for cannabis use disorder. - PsycNET \(apa.org\)](#)

⁴¹ [Persisting on the past: Cross-sectional and prospective associations between sunk cost propensity and cannabis use. - PsycNET \(apa.org\)](#)

⁴² [Frontiers | The Effects of Cannabis Use Frequency and Episodic Specificity Training on the Recall of Specific and Rewarding Events | Psychiatry \(frontiersin.org\)](#)

⁴³ [Initial evaluation of domain-specific episodic future thinking on delay discounting and cannabis use. - PsycNET \(apa.org\)](#)

⁴⁴ [A web-based episodic specificity and future thinking session modulates delay discounting in cannabis users. - PsycNET \(apa.org\)](#)

⁴⁵ [Cannabis Use Disorder and Its Treatment | SpringerLink](#)

⁴⁶ [Greater delay discounting and cannabis coping motives are associated with more frequent cannabis use in a large sample of adult cannabis users - ScienceDirect](#)

- Leveraged survey items validated and popular in regulatory and industry cannabis settings, such as willingness to pay questions⁴⁷, instead of solely relying on questions more commonly sourced from health research settings.
- Recruitment of a population-representative sample that matches the population at large
 - By recruiting a sample whose demographic characteristics closely match those of the population, researchers can effectively rule out the potential explanation of survey findings that hinge on differences in demographic characteristics between the samples.
- Use of statistical testing to determine 95% or higher confidence when relevant.
- Statistically controlled for relevant covariates whenever predicting the effects of living in a ZIP code with an adult-use store on the proportion of cannabis accessed from adult-use stores to increase confidence in a direct relationship between adult-use store location among participants and adult-use store purchasing behavior.

⁴⁷ [The cannabis industry: a natural laboratory for marketing strategy research | SpringerLink](#)